

## 1 ABSTRACT

2 Method and apparatus are contemplated for receiving from an input, an optical  
3 signal in a volume hologram comprising a transfer function that may comprise temporal  
4 or spectral information, and spatial transformation information; diffracting the optical  
5 signal; and transmitting the diffracted optical signal to an output. A plurality of inputs  
6 and outputs may be coupled to the volume hologram. The transformation may be a  
7 linear superposition of transforms, with each transform acting on an input signal or on a  
8 component of an input signal. Each transform may act to focus one or more input  
9 signals to one or more output ports. A volume hologram may be made by various  
10 techniques, and from various materials. A transform function may be calculated by  
11 simulating the collision of a design input signal with a design output signal.